CLAIMS

What is claimed is:

1. A fiber reinforcement material, comprising:

a plurality of polyolefinic strands of monofilaments of about 350 to about 6000 denier per filament, twisted to form a fiber bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

2. The fiber reinforcement material of claim 1, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

3. The fiber reinforcement material of claim 1, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

4. The fiber reinforcement material of claim 1, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

5. The fiber reinforcement material of claim 1, wherein the strands are about 750 denier per filament.

6. The fiber reinforcement material of claim 1, wherein the strands are a copolymer formed of polypropylene and polyethylene.

7. The fiber reinforcement material of claim 6, wherein the copolymer is about 75-80 percent by weight polypropylene and about 20-25 percent by weight polyethylene.

8. The fiber reinforcement material of claim 6, wherein the polypropylene is a low melt polypropylene and the polyethylene is a high density polyethylene.

9. The fiber reinforcement material of claim 1, wherein the length of the component is about 19 to 60 mm.

10. The fiber reinforcement material of claim 1, wherein the fiber bundle is non-interconnected.

11. The fiber reinforcement material of claim 1, wherein the monofilaments are nonfibrillating.

12. A reinforcement for cementitious material, comprising:

a plurality of polyolefin monofilaments, the plurality of monofilaments being in a twisted configuration, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

13. The fiber reinforcement material of claim 12, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

14. The fiber reinforcement material of claim 12, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

15. The fiber reinforcement material of claim 12, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

16. The fiber reinforcement material of claim 12, wherein the cementitious material is concrete.

17. The fiber reinforcement material of claim 12, wherein the cementitious material is asphalt.

18. A reinforced cementitious material, comprising:

a cementitious mass; and,

a fiber component dispersed throughout the mass, the fiber component being a plurality of polyolefinic strands of monofilaments of about 350 to about 6000 denier per filament

twisted to form a fiber bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

19. The fiber reinforcement material of claim 18, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

20. The fiber reinforcement material of claim 18, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

21. The fiber reinforcement material of claim 18, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

22. The fiber reinforcement material of claim 18, wherein the strands are a copolymer formed of polypropylene and polyethylene.

23. The fiber reinforcement material of claim 22, wherein the copolymer is about 75-80 percent by weight polypropylene and about 20-25 percent by weight polyethylene.

24. The fiber reinforcement material of claim 18, wherein the length of the component is about 19 to 60 mm.

25. The fiber reinforcement material of claim 18, wherein the monofilaments are nonfibrillating and the fiber bundle is non-interconnected.

26. The fiber reinforcement material of claim 18, wherein the cementitious mass is concrete.

27. The fiber reinforcement material of claim 18, wherein the cementitious mass is asphalt.

28. A reinforcement material for a cemetitious material formed by twisting a plurality of polyolefinic strands of monofilaments into a fiber bundle for mixing into a cementitious mass, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

29. The reinforcement material of claim 28, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

30. The reinforcement material of claim 28, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

31. The reinforcement material of claim 28, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

32. The reinforcement material of claim 28, wherein the cementitious mass is concrete.

33. The reinforcement material of claim 28, wherein the cementitious mass is asphalt.

34. A synthetic fiber blend for use as reinforcement for cementitious material, comprising:

a first fiber component being fibrillated and formed of a homopolymer material; and

a second synthetic fiber component being a copolymer that is discrete from the first fiber component and being a plurality of monofilaments twisted to form a non-interconnected bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

35. The synthetic blend of claim 34, wherein the first fiber component is added to the synthetic blend in amounts ranging from about 5 to about 50 weight percent, and the second fiber component is added to the synthetic blend in amounts ranging from about 95 weight percent.

36. The synthetic blend of claim 34, wherein the second fiber component is twisted to form the non-interconnected bundle in the absence of a wetting agent.

37. The synthetic blend of claim 34, wherein the first fiber component and the second fiber component are blended in the absence of a wetting agent.

38. The synthetic blend of claim 34, wherein the degree of twist in the second fiber component is less than about 2.2 turns/inch (about 0.87 turns/cm).

39. The synthetic blend of claim 34, wherein the degree of twist in the second fiber component ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

40. The synthetic blend of claim 34, wherein the degree of twist in the second fiber component is about 1.1 turns/inch (about 0.43 turns/cm).

41. A synthetic fiber blend for use as reinforcement for cementitious material, comprising:

a first fiber component formed from a homopolymer of polypropylene and composed of fibers in fibrillated form; and

a second fiber component, discrete from the first fiber component, formed from a copolymer of polypropylene and high density polyethylene, and composed of bundles of monofilaments that have been twisted, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

42. The synthetic blend of claim 41, wherein the degree of twist in the second fiber component is less than about 2.2 turns/inch (about 0.87 turns/cm).

43. The synthetic blend of claim 41, wherein the degree of twist in the second fiber component ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

44. The synthetic blend of claim 41, wherein the degree of twist in the second fiber component is about 1.1 turns/inch (about 0.43 turns/cm).

45. A synthetic fiber blend for use as reinforcement for cementitious material, comprising:

a first fibrillated fiber component formed of a homopolymer polypropylene fiber; and

a second fiber component being discrete from the first fiber component and being a copolymer formed of a polypropylene and a high density polyethylene, the second fiber component being a plurality of monofilaments twisted to form a non-interconnected bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

46. The synthetic blend of claim 45, wherein the degree of twist in the second fiber component is less than about 2.2 turns/inch (about 0.87 turns/cm).

47. The synthetic blend of claim 45, wherein the degree of twist in the second fiber component ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

48. The synthetic blend of claim 45, wherein the degree of twist in the second fiber component is about 1.1 turns/inch (about 0.43 turns/cm).

49. The synthetic fiber blend of claim 45, wherein the first fiber component is present in the synthetic fiber blend in amounts ranging from about 5 to about 50 by total weight percent.

50. The synthetic fiber blend of claim 45, wherein the first fiber component is about 100 to about 20,000 denier per filament.

51. The synthetic fiber blend of claim 45, wherein the second fiber component is present in the synthetic fiber blend in amounts ranging from about 50 to about 95 by total weight percent.

52. The synthetic fiber blend of claim 45, wherein the second fiber component is made of one or more nonfibrillating monofilaments of about 350 to about 6000 denier per filament.

53. The synthetic fiber blend of claim 45, wherein the first fiber component has a fiber length of about 19 to about 60 mm and the second fiber component has a fiber length of about 19 to about 60 mm.

54. The synthetic fiber blend of claim 53, wherein the first fiber component and the second fiber component have about the same fiber length.

55. The synthetic blend of claim 45 wherein the monofilaments of the second fiber component, in the absence of a wetting agent, are twisted.

56. The synthetic blend of claim 45, wherein the first fiber component and the second fiber component are blended in the absence of a wetting agent.

57. A synthetic fiber blend for use as reinforcement for cementitious material, comprising:

a first fibrillated fiber component formed of a homopolymer polypropylene fiber; and

a second fiber component being discrete from the first fiber component and being a copolymer formed of a major amount of a polypropylene and a minor amount of a high density polyethylene, the second fiber component being a plurality of monofilaments twisted to form a non-interconnected bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm);

the first fiber component being present in the synthetic fiber blend in amounts ranging from about 5 to about 50 by total weight percent, and the second fiber component being present in the synthetic fiber blend in amounts ranging from about 50 to about 95 by total weight percent.

58. The synthetic fiber blend of claim 57, wherein the degree of twist in the second fiber component is less than about 2.2 turns/inch (about 0.87 turns/cm).

59. The synthetic fiber blend of claim 57, wherein the degree of twist in the second fiber component ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

60. The synthetic fiber blend of claim 57, wherein the degree of twist in the second fiber component is about 1.1 turns/inch (about 0.43 turns/cm).

61. The synthetic fiber blend of claim 57, wherein the first fiber component is about 100 to about 20,000 denier per filament, and the second fiber component is about 350 to about 6000 denier per filament.

62. The synthetic fiber blend of claim 57, wherein the first fiber component is a fibrillated fiber having a fiber length of about 19 to about 60 mm and the second fiber component is in the form of nonfibrillating monofilaments having a fiber length of about 19 to about 60 mm.

63. The synthetic fiber blend of claim 57, wherein the first fiber component is present in the synthetic blend in about 6.7 total weight percent and second fiber component is present in the synthetic fiber blend in about 93.3 percent by total weight percent.

64. The synthetic fiber blend of claim 57 wherein the second fiber is formed of about 70 to 80 percent by weight polypropylene and about 20 to 30 percent by weight high density polyethylene.

65. The synthetic fiber blend of claim 57, wherein the monofilaments of the second fiber component, in the absence of a wetting agent, are twisted.

66. A reinforced cementitious material, comprising:

a synthetic fiber blend distributed through a matrix of the cementitious material, the synthetic fiber blend, including:

a first fiber component formed of a homopolymer polypropylene fiber; and

a second fiber component being discrete from the first fiber component and being a copolymer formed of a polypropylene and a high density polyethylene, the second fiber component being a plurality of monofilaments twisted to form a non-interconnected bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

67. The reinforced cementitious material of claim 66, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

68. The reinforced cementitious material of claim 66, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

69. The reinforced cementitious of claim 66, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

70. The reinforced cementitious material of claim 66, wherein the first fiber component is fibrillated and present in the synthetic fiber blend in amounts ranging from about 5 to about 50 by total weight percent, and the second fiber component is comprised of one or more twisted

nonfibrillating monofilaments present in the synthetic fiber blend in amounts ranging from about 50 to about 95 by total weight percent.

71. The reinforced cementitious material of claim 66, wherein the first fiber component is present in the synthetic blend in about 6.7 total weight percent and second fiber component is present in the synthetic fiber blend in about 93.3 percent by total weight percent.

72. The reinforced cementitious material of claim 66, wherein the synthetic fiber blend is present in the cementitious material in amounts ranging from about 0.1 to about 2.0 percent by volume.

73. The reinforced cementitious material of claim 66, wherein the synthetic fiber blend is present in the cementitious material in amounts ranging from about 0.5 to about 2.0 percent by volume.

74. The reinforced cementitious material of claim 66, wherein the synthetic fiber blend is present in the cementitious material in amounts ranging from about 0.3 to about 2.0 percent by volume.

75. The reinforced cementitious material of claim 66, wherein the cementitious material is reinforced concrete.

76. The reinforced cementitious material of claim 66, wherein the cementitious material is reinforced asphalt.

77. A method of forming a reinforcement for cementitious material, comprising:

twisting a plurality of polyolefinic strands of monofilaments of about 350 to about 6000 denier per filament into a fiber bundle for mixing into a cementitious mass to form the cementitious material, said twisting occurring to a degree that is greater than about 0.9 turns/inch (about 0.36 turns/cm).

78. The method of claim 77, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

79. The method of claim 77, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

80. The method of claim 77, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

81. The method of claim 77, wherein the strands are a copolymer formed of polypropylene and polyethylene.

82. The method of claim 81, wherein the copolymer is about 75-80 percent by weight polypropylene and about 20-25 percent by weight polyethylene.

83. The method of claim 77, wherein the length of the component is about 19 to 60 mm.

84. The method of claim 77, wherein the fiber bundle is non-interconnected.

85. The method of claim 77, wherein the cementitious mass is concrete.

86. The method of claim 77, wherein the cementitious mass is asphalt.

87. A method of forming a reinforced cementitous material, comprising:

adding to a cementitious mass a plurality of polyolefinic strands of monofilaments of about 350 to about 6000 denier per filament twisted to form the fiber bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

88. The method of claim 87, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

89. The method of claim 87, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

90. The method of claim 87, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

91. The method of claim 87, wherein the strands are a copolymer formed of polypropylene and polyethylene.

92. The method of claim 91, wherein the copolymer is about 75-80 percent by weight polypropylene and about 20-25 percent by weight polyethylene.

93. The method of claim 87, wherein the length of the component is about 19 to 60 mm.

94. The method of claim 87, wherein the fiber bundle is non-interconnected.

95. The method of claim 87, wherein the cementitious mass is concrete.

96. The method of claim 87, wherein the cementitious mass is asphalt.

97. A method of forming a synthetic fiber blend, comprising:

blending a first fiber component with a second fiber component, the first fiber component being fibrillated and being formed of a homopolymer polypropylene fiber, the second fiber component being discrete from the first fiber component and being a copolymer of

a polypropylene and a high density polyethylene, the second fiber component being twisted to form a fiber bundle, the degree of twist being greater than about 0.9 turns/inch.

98. The method of claim 97, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

99. The method of claim 97, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

100. The method of claim 97, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

101. The method of claim 97, wherein the first fiber component is present in the synthetic fiber blend in amounts ranging from about 5 to about 50 by total weight percent, and the second fiber component is present in the synthetic fiber blend in amounts ranging from about 50 to about 95 by total weight percent.

102. The method of claim 97, wherein the first fiber component is present in the synthetic blend in about 6.7 total weight percent and second fiber component is present in the synthetic fiber blend in about 93.3 percent by total weight percent.

103. The method of claim 97, wherein the first fiber component is fibrillated and the second fiber component is comprised of a twisted bundle of multiple strands of a nonfibrillating monofilament, said first and second fiber components being substantially the same length, wherein each has a length ranging from about 19 to 60 mm.

104. A method of reinforcing a material, comprising:

mixing a synthetic fiber blend with a cementitious material, the synthetic fiber blend including a first fiber component and a second fiber component, the first fiber component being fibrillated and formed of a homopolymer polypropylene fiber, the second fiber component being discrete from the first fiber component and being a copolymer formed of a major amount of polypropylene and a minor amount of high density polyethylene, the second fiber component being twisted to form a fiber bundle, the degree of twist being greater than about 0.9 turns/inch (about 0.36 turns/cm).

105. The method of claim 104, wherein the degree of twist is less than about 2.2 turns/inch (about 0.87 turns/cm).

106. The method of claim 104, wherein the degree of twist ranges from greater than about 0.9 turns/inch (about 0.36 turns/cm) to about 1.1 turns/inch (about 0.43 turns/cm).

107. The method of claim 104, wherein the degree of twist is about 1.1 turns/inch (about 0.43 turns/cm).

108. The method of claim 104, wherein the first fiber component is present in the synthetic fiber blend in amounts ranging from about 5 to about 50 by total weight percent, and the second fiber component is present in the synthetic fiber blend in amounts ranging from about 50 to about 95 by total weight percent.

109. The method of claim 104, wherein the first fiber component is present in the synthetic blend in about 6.7 total weight percent and second fiber component is present in the synthetic fiber blend in about 93.3 percent by total weight percent.

110. The method of claim 104, wherein the cementitious material is concrete.

111. The method of claim 104, wherein the cementitous material is asphalt.

112. The method of claim 104, wherein a sufficient amount of synthetic fiber is added to the cementitious material to increase the material's impact strength.

113. The method of claim 112 wherein the synthetic fiber is added to the cementitious material in amounts ranging from about 0.1 to about 2.0 percent by total volume.

114. The method of claim 113, wherein the synthetic fiber is added to the cementitious material in amounts ranging from about 0.5 to about 2.0 percent by total volume.

115. The method of claim 104, wherein an addition of synthetic fiber to the material in amounts ranging from about 0.5 to about 2.0 percent by total volume provides an impact strength improvement of at least 6 times that of plain concrete.

116. The method of claim 104, wherein the first fiber component is a fibrillated fiber and the second fiber component is comprised of a twisted bundle of multiple strands of a nonfibrillating monofilament.